

EMC TEST REPORT

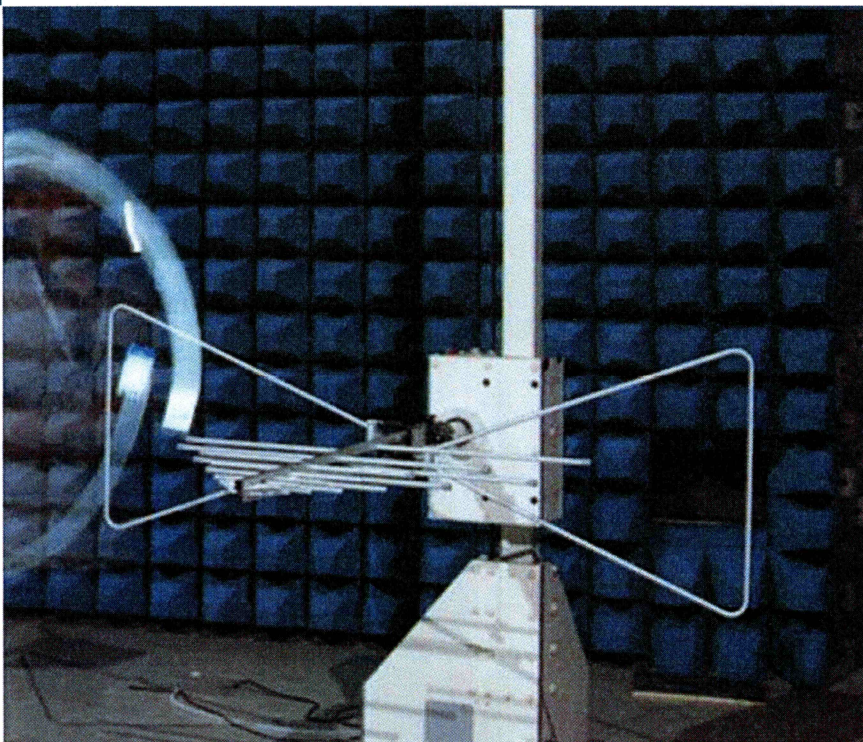
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Door and Window Sensor

ISSUED TO
Konec Home Pty Ltd

Suite 5.02 level 5 15 Talavera Road Macquarie Park NSW 2113
Australia



Tested by: Hu Qingshan

Hu Qingshan

Date: Aug. 11, 2021

Approved by: [Signature]

Liao Jianming
(Technical Director)

Date: Aug. 11, 2021

Report No.: BL-SZ2140983-401

EUT Name: Door and Window Sensor

Model Name: MCCGQ11LM

Brand Name: Aqara

Test Standard: AS/NZS CISPR 32: 2015+AMD1:2020

Test Conclusion: Pass

Test Date: Apr. 28, 2021 ~ May 11, 2021

Date of Issue: Aug. 11, 2021

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Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Aug. 11, 2021</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20°C to 25°C
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

- (1) The test report reference to the report template version v4.1.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (7) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Konec Home Pty Ltd
Address	Suite 5.02 level 5 15 Talavera Road Macquarie Park NSW 2113 Australia

2.2 Manufacturer Information

Manufacturer	Lumi United Technology Co., Ltd
Address	8th Floor, JinQi Wisdom Valley, No.1 Tangling Road, Liuxian Ave, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Door and Window Sensor
Model Name Under Test	MCCGQ11LM
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	V1.0.1
Software Version	V1.0.1
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	N/A
	Model No.	CR1632
	Serial No.	N/A
	Capacity	N/A
	Rated Voltage	3.0 V
	Limit Charge Voltage	N/A

2.6 Technical Information

Network and Wireless connectivity		Zigbee
Interfaces present on the EUT	AC Ports	No AC Ports.
	DC Ports	From power supply to EUT, the DC port cable length is less than 3m.
	I/O Ports	No I/O Ports.
	Telecom Ports	No Tel ports.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	AS/NZS CISPR 32: 2015+AMD1:2020	Electromagnetic compatibility of multimedia equipment — Emission requirements

3.2 Verdict

No.	Base Standard	Description		Test Verdict	Result	Remark
Emission						
1	CISPR 32	Radiated Emission	Below 1 GHz	Pass	ANNEX A.1	--
			Above 1 GHz	Pass		Note 1
2	CISPR 32	Conducted Emission	Mains terminals	N/A	ANNEX A.2	--
			Asymmetric mode	N/A	ANNEX A.3	Note 2
			Differential voltage	N/A	ANNEX A.4	Note 3
Note 1: The highest frequency of the internal sources of the EUT is above 108 MHz, the measurement shall be made above 1 GHz.						
Note 2: For cables longer than 3 m only.						
Note 3: For Class B broadcasting receiver only.						

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions (9 kHz-30 MHz)	2.96 dB
Radiated emissions (30 MHz-1 GHz)	3.67 dB
Radiated emissions (1 GHz-18 GHz)	3.57 dB
Radiated emissions (18 GHz-40 GHz)	5.16 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	23°C to 25°C	DC 3 V from Battery	50% to 55%	100 kPa to 102 kPa

4.2 Test Equipment

Radiated Emission Test For Frequency Below 1 GHz (10 m)						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2020.06.09	2021.06.08	<input type="checkbox"/>
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9168	9168-0883	2020.05.11	2022.05.10	<input type="checkbox"/>
Anechoic Chamber	EMC Electronic Co., Ltd	20.10*11.60*7.35m	N/A	2018.08.08	2021.08.07	<input type="checkbox"/>

Radiated Emission Test For Frequency Below 1 GHz (3 m)						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2020.09.18	2021.09.17	<input checked="" type="checkbox"/>
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2019.07.02	2021.07.01	<input checked="" type="checkbox"/>
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2020.03.16	2023.03.15	<input checked="" type="checkbox"/>

Radiated Emission Test For Frequency Above 1 GHz						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2020.09.18	2021.09.17	<input checked="" type="checkbox"/>
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1917	2019.07.02	2021.07.01	<input checked="" type="checkbox"/>
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2020.03.16	2023.03.15	<input checked="" type="checkbox"/>

Conducted disturbance Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9010B	MY57110309	2020.06.08	2021.06.07	<input type="checkbox"/>
LISN	SCHWARZBECK	NSLK 8127	8127-687	2020.06.09	2021.06.08	<input type="checkbox"/>
ISN	TESEQ	ISN T800	34449	2020.09.18	2021.09.17	<input type="checkbox"/>
ISN	TESEQ	ISN T8-CAT6	53561	2020.06.09	2021.06.08	<input type="checkbox"/>
Shielded Enclosure	YiHeng Electronic Co., Ltd	3.4m*3.1m*2.8m	N/A	2018.08.16	2021.08.15	<input type="checkbox"/>

4.3 Test Enclosure list

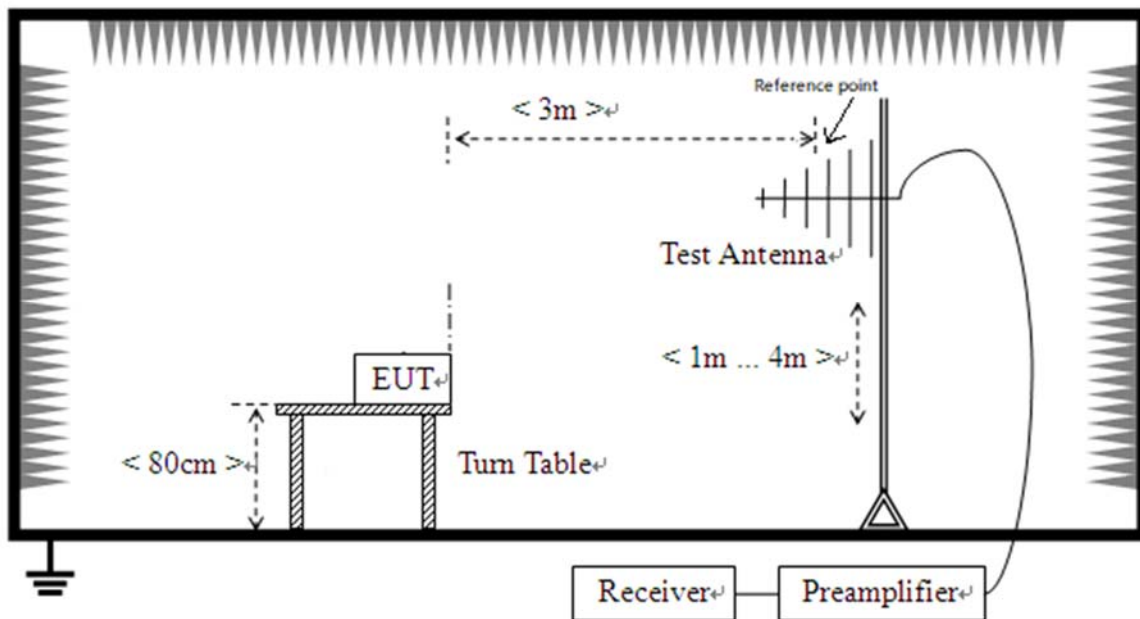
Description	Manufacturer	Model	Serial No.	Length	Description	Use
Phone	HUAWE	P30	N/A	N/A	N/A	<input checked="" type="checkbox"/>
Adapter	OPPO	AK903HK	N/A	N/A	N/A	<input checked="" type="checkbox"/>
Gateway M2	N/A	N/A	N/A	N/A	N/A	<input checked="" type="checkbox"/>
USB Cable	N/A	N/A	N/A	N/A	N/A	<input checked="" type="checkbox"/>

4.4 Test Configurations

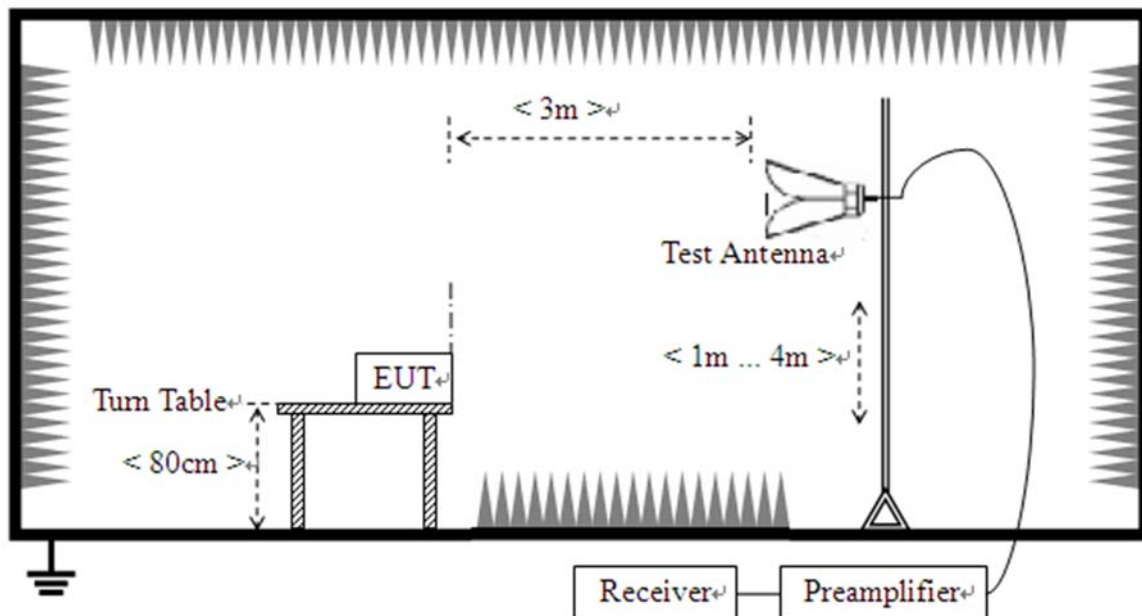
Test Configurations (TC) No.	Description
TC01	<u>The Working Test Mode</u> EUT + Battery + USB Cable + Adapter + Gateway M2 + Phone

4.5 Test Setups

Test Setup 1

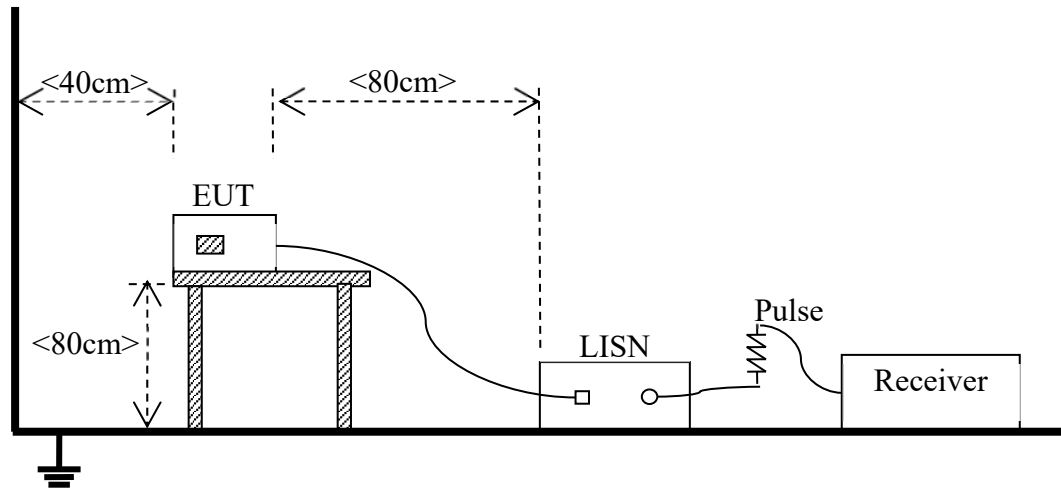


(For Radiated Emission Test (30 MHz-1 GHz))



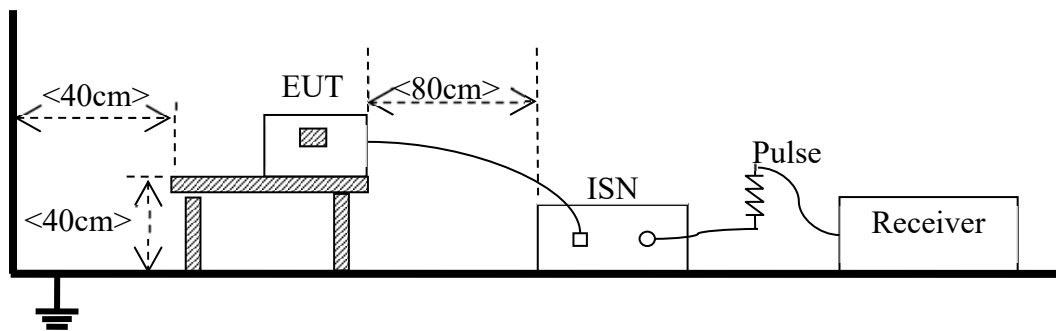
(For Radiated Emission Test (above 1 GHz))

Test Setup 2



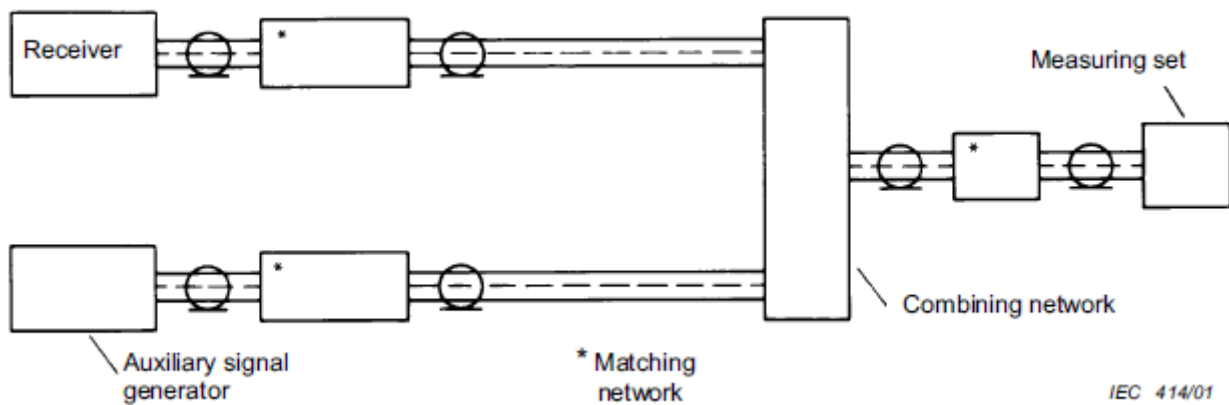
(For Conducted disturbance voltage at mains terminals Test)

Test Setup 3



(For Conducted disturbance for asymmetric mode Test)

Test Setup 4



(For Conducted differential voltage emission (TV/FM broadcast receiver tuner ports))

4.6 Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Env.	NTNV
	Test Setup	Test Setup 1
	Test Configuration	TC01 ^{Note}
Note: Based on client request, all normal using modes of the normal function were tested, but only the worst test data of test mode is reported in this report. The Working Test Mode is the worst mode in this report.		

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency range (MHz)	Class A (at 3 m)	Class B (at 3 m)
	Quasi-Peak Limit (dBμV/m)	Quasi-Peak Limit (dBμV/m)
30 - 230	50	40
230 - 1000	57	47

Frequency range (MHz)	Class A (at 3 m)		Class B (at 3 m)	
	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)
1000-3000	76	56	70	50
3000-6000	80	60	74	54

Requirements for radiated emissions from FM receivers

Frequency range (MHz)	Measurement		Quasi-Peak Limit (dBμV/m) Fundamental	Quasi-Peak Limit (dBμV/m) Harmonics	Quasi-Peak Limit (dBμV/m) Other
	Facility	Distance (m)			
30-230	OATS/SAC	10	50	42	30
230-300				42	37
300-1000				46	37
30-230	OATS/SAC	3	60	52	40
230-300				52	47
300-1000				56	47

NOTE:

- 1) The lower limit shall apply at the transition frequency.
- 2) Additional provisions may be required for cases where interference occurs.

5.1.1.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 1. The photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.1.1.4 Test Result

Please refer to ANNEX A.1.

5.1.2 Conducted disturbance voltage at mains terminals

5.1.2.1 Test Limit

Frequency range (MHz)	Class A		Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	79	66	66-56	56-46
0.50 - 5	73	60	56	46
5 - 30	73	60	60	50

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 2. The photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω /50 μ H of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

5.1.3 Conducted disturbance for asymmetric mode

5.1.3.1 Test Limit

Frequency range (MHz)	Class A		Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	97-87	84-74	84-74	74-64
0.50 - 30	87	74	74	64

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.3.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 3. The photo of test setup please refer to ANNEX B.

5.1.3.3 Test Procedure

Measurement of common mode (asymmetric mode) current or voltage emissions at wired network ports for attachment of unscreened balanced pairs shall be performed with the wired network port connected by a cable to an AAN. The AAN shall define the common mode termination impedance seen by the wired network port during the emission measurements.

The voltage division factor shall be added to the measured voltage measured by the receiver directly at the voltage measurement port of the AAN and the result compared with the voltage limits as applicable.

5.1.3.4 Test Result

Please refer to ANNEX A.3.

5.1.4 Conducted differential voltage emission

5.1.4.1 Test Limit

Applicability	Frequency range (MHz)	Differential voltage limit @75Ω(dBuV)		
		Local Oscillator Fundamental	Local Oscillator Harmonics	Other
Television receivers; video recorders; PC TV broadcast receiver tuner cards; Digital audio receivers	30 to 950	46	46	46
	950 to 2150	54	54	46
Tuner units (not the LNB) for satellite signal reception	950 to 2150	54	54	46
FM audio receivers and PC tuner cards	30 to 300	54	50	46
	300 to 1000	54	52	46
FM car radios	30 to 300	66	59	46
	300 to 1000	66	52	46
RF modulator output ports connect to TV broadcast receiver tuner ports	30 to 950	76	46	46
	950 to 2150	N/A	54	46

5.1.4.2 Test Setup

Please refer to 4.5 section description of test setup of test setup 4. The photo of test setup please refer to ANNEX B.

5.1.4.3 Test Procedure

1. The impedance as seen from the TV/FM broadcast receiver tuner port of the EUT shall be equal to the nominal antenna input impedance for which the port has been designed. The EUT shall be tuned to the wanted signal from the AE (signal generator). The emission level shall be measured across the relevant frequency range taking into account the attenuation between the EUT TV/FM broadcast receiver tuner port and the measurement device.
2. The RF modulator output port of the EUT is connected to the input of the measuring device by means of a coaxial cable and a matching network (if necessary). The characteristic impedance of the cable shall be equal to the nominal output impedance of the EUT. The EUT shall produce an RF carrier modulated by a video signal defined. The RF output level shall be obtained by adding the insertion loss of the matching network to the indication of the measuring device (tuned to the video carrier frequency and its harmonics).

5.1.4.4 Test Result

Please refer to ANNEX A.4.

ANNEX A TEST RESULTS

A.1 Radiated Emission

Note 1: The symbol of "--" in the table which means not application.

Note 2: Measurements shall be made with a quasi-peak measuring receiver in the frequency range 30 MHz to 1000 MHz.

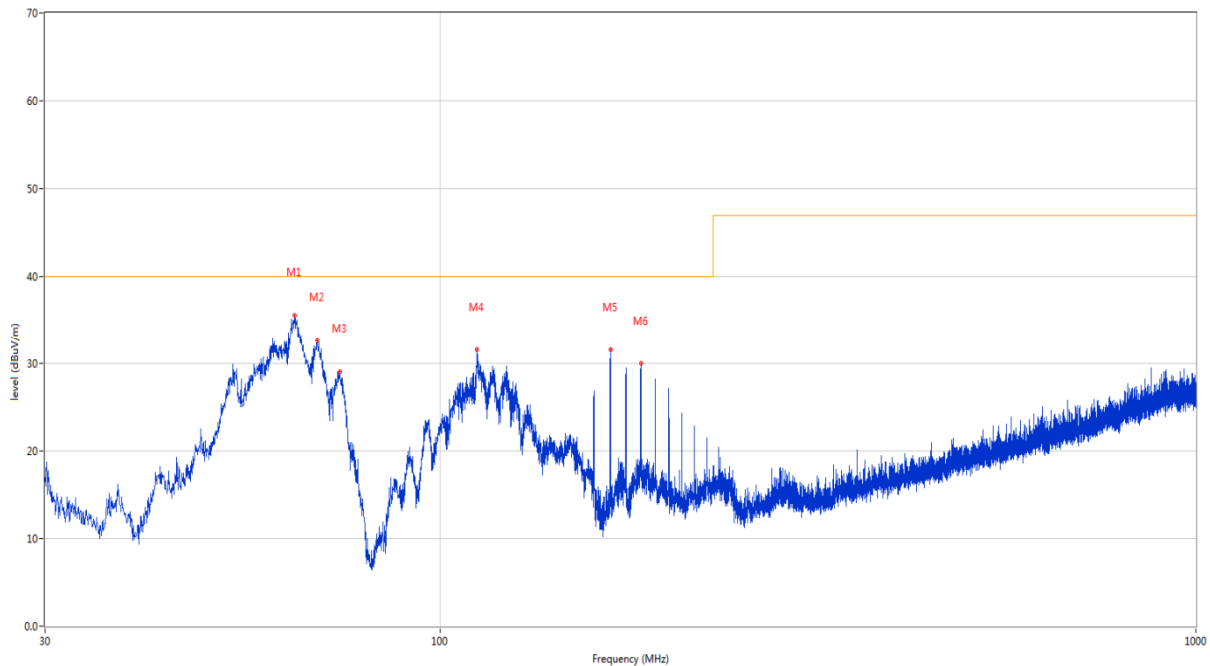
To reduce the testing time, a peak measuring receiver may be used instead of a quasi-peak measuring receiver. In case of dispute, measurement with a quasi-peak measuring receiver will take precedence.

Note 3: The marked spikes near 2400 MHz with circle should be ignored because they are Zigbee carrier frequency.

Test Data and Plots (Below 1 GHz)

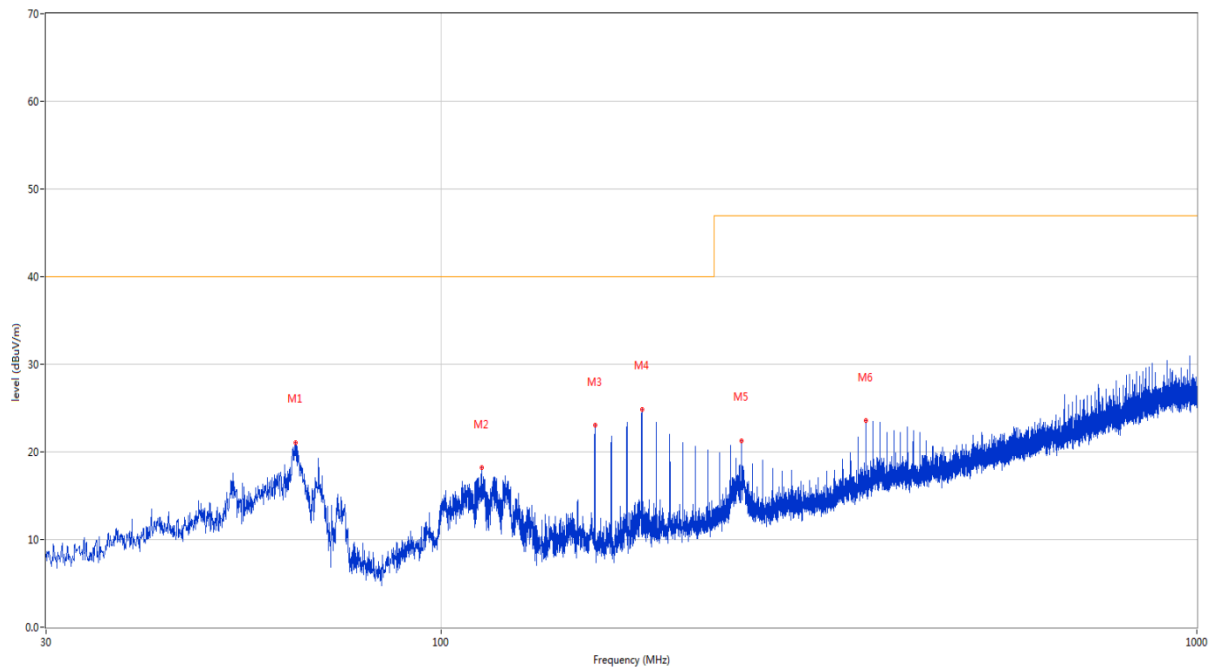
The Working Test Mode

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	64.241	35.55	-24.96	40.0	-4.45	Peak	271.10	100	Vertical	Pass
2	68.703	32.67	-26.29	40.0	-7.33	Peak	239.00	100	Vertical	Pass
3	73.650	29.08	-28.49	40.0	-10.92	Peak	225.90	100	Vertical	Pass
4	111.771	31.61	-24.47	40.0	-8.39	Peak	318.40	100	Vertical	Pass
5	167.934	31.59	-27.16	40.0	-8.41	Peak	118.60	100	Vertical	Pass
6	184.327	29.97	-25.34	40.0	-10.03	Peak	150.30	100	Vertical	Pass

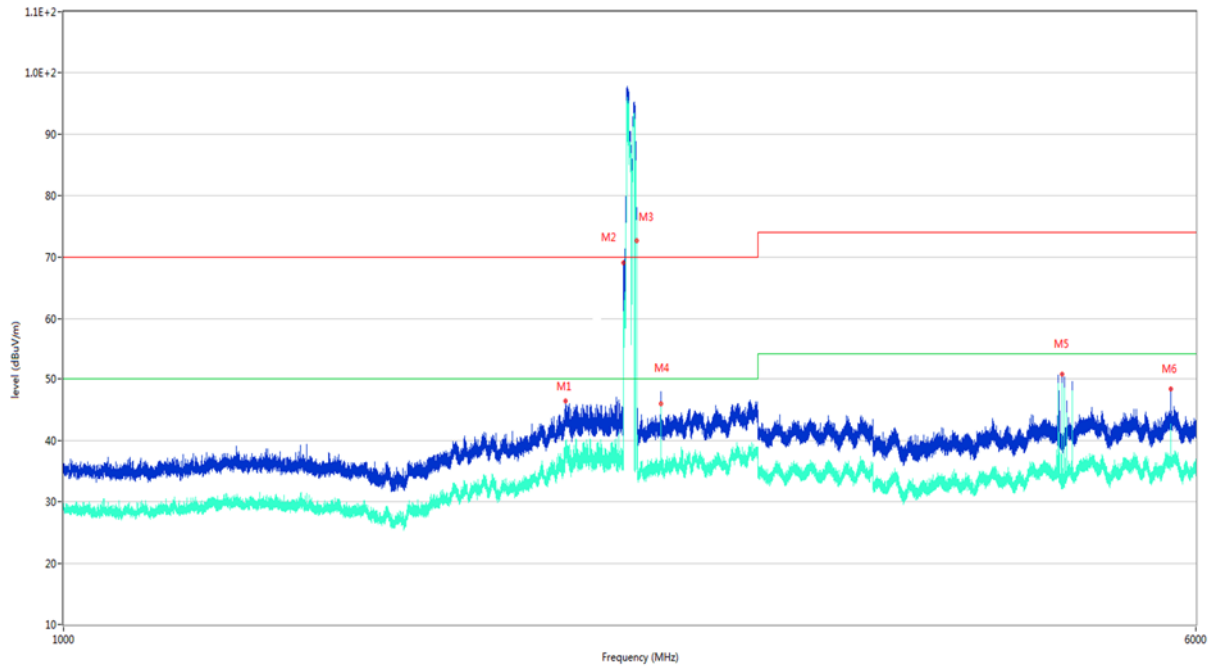
A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	64.241	21.01	-24.96	40.0	-18.99	Peak	244.30	100	Horizontal	Pass
2	113.129	18.24	-24.50	40.0	-21.76	Peak	346.20	100	Horizontal	Pass
3	159.738	23.10	-27.39	40.0	-16.90	Peak	330.10	100	Horizontal	Pass
4	184.327	24.87	-25.34	40.0	-15.13	Peak	98.20	100	Horizontal	Pass
5	249.899	21.24	-22.91	47.0	-25.76	Peak	291.60	100	Horizontal	Pass
6	364.553	23.57	-19.77	47.0	-23.43	Peak	196.60	100	Horizontal	Pass

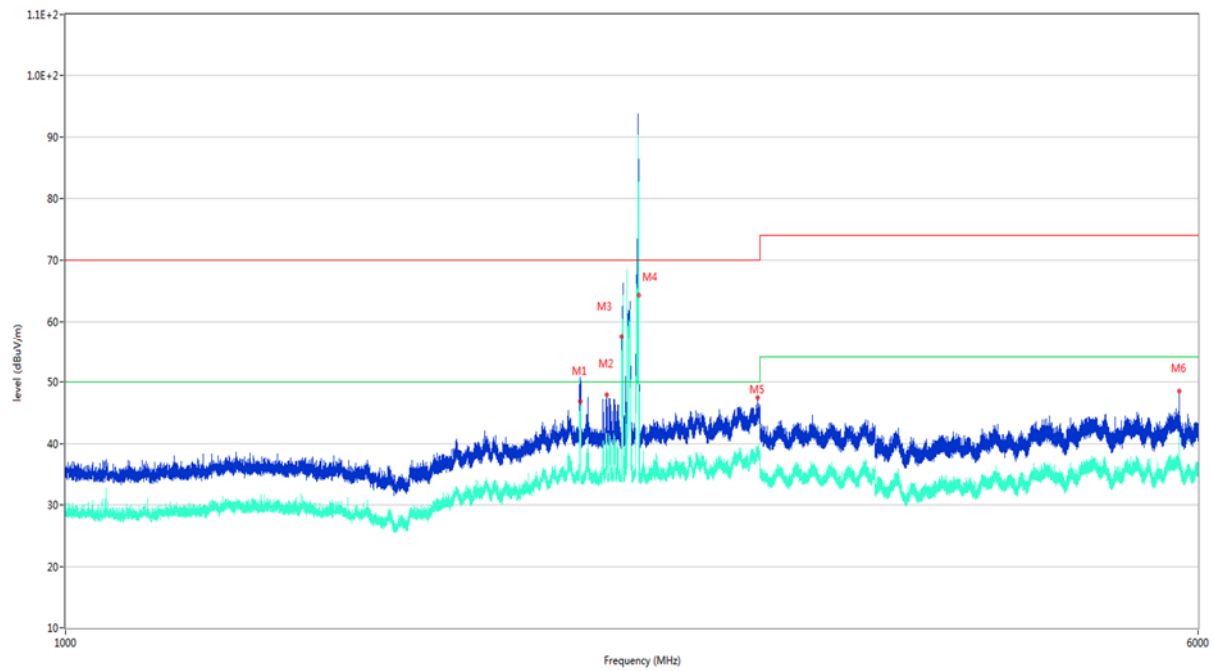
Test Data and Plots (Above 1 GHz)

A.1.3 Test Antenna Vertical, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2213.400	46.33	-9.13	70.0	-23.67	Peak	223.20	100	Vertical	Pass
1**	2213.400	37.43	-9.13	50.0	-12.57	AV	223.20	100	Vertical	Pass
2	2413.800	69.02	-10.06	70.0	-0.98	Peak	216.10	100	Vertical	N/A
2**	2413.800	57.65	-10.06	50.0	7.65	AV	216.10	100	Vertical	N/A
3	2475.700	75.27	-9.96	70.0	5.27	Peak	202.10	100	Vertical	N/A
3**	2475.700	72.64	-9.96	50.0	22.64	AV	202.10	100	Vertical	N/A
4	2574.100	47.81	-8.95	70.0	-22.19	Peak	167.00	100	Vertical	Pass
4**	2574.100	45.98	-8.95	50.0	-4.02	AV	167.00	100	Vertical	Pass
5	4854.000	50.72	-3.53	74.0	-23.28	Peak	343.40	100	Vertical	Pass
5**	4854.000	48.30	-3.53	54.0	-5.70	AV	343.40	100	Vertical	Pass
6	5767.350	48.41	-2.84	74.0	-25.59	Peak	16.60	100	Vertical	Pass
6**	5767.350	42.59	-2.84	54.0	-11.41	AV	16.60	100	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 6 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (Degree)	Height (cm)	Antenna	Verdict
1	2256.400	47.16	-10.28	70.0	-22.84	Peak	164.10	100	Horizontal	Pass
1**	2256.400	46.91	-10.28	50.0	-3.09	AV	164.10	100	Horizontal	Pass
2	2353.600	47.95	-10.23	70.0	-22.05	Peak	360.00	100	Horizontal	Pass
2**	2353.600	39.14	-10.23	50.0	-10.86	AV	360.00	100	Horizontal	Pass
3	2401.500	57.53	-10.08	70.0	-12.47	Peak	318.30	100	Horizontal	N/A
3**	2401.500	34.00	-10.08	50.0	-16.00	AV	318.30	100	Horizontal	N/A
4	2478.100	39.92	-9.88	70.0	-30.08	Peak	118.80	100	Horizontal	N/A
4**	2478.100	64.23	-9.88	50.0	14.23	AV	118.80	100	Horizontal	N/A
5	2991.000	47.38	-5.23	70.0	-22.62	Peak	360.00	100	Horizontal	Pass
5**	2991.000	38.77	-5.23	50.0	-11.23	AV	360.00	100	Horizontal	Pass
6	5824.200	48.43	-2.96	74.0	-25.57	Peak	117.10	100	Horizontal	Pass
6**	5824.200	36.40	-2.96	54.0	-17.60	AV	117.10	100	Horizontal	Pass

A.2 Conducted disturbance voltage at mains terminals Test

Note: Not applicable.

A.3 Conducted disturbance for asymmetric mode

Note: Not applicable.

A.4 Conducted differential voltage emission

Note: Not applicable.

ANNEX B TEST SETUP PHOTOS

Please refer the document "BL-SZ2140983-AE.PDF".

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document "BL-SZ2140983-AW.PDF".

ANNEX D EUT INTERNAL PHOTOS

Please refer the document "BL-SZ2140983-AI.PDF".

--END OF REPORT--